

A new species of *Chiromantes* s. str. (Decapoda: Brachyura: Sesarmidae) from the Ryukyu Islands, Japan, with a note on the identity of *Holometopus serenei* Soh, 1978

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Abstract.—A new species of the genus *Chiromantes* Gistel, 1848 s. str. is described from the Ryukyu Islands. The new species is distinguished from another species of *Chiromantes* s. str., *C. haematocheir* (De Haan, 1833), by having proportionately longer and less setose ambulatory legs, a relatively flatter carapace, larger eyes, proportionally narrower front, relatively broader male sixth abdominal segment, less inflated male chela, and distinct colouration. The present study also regards *Holometopus serenei* as a junior subjective synonym of *C. haematocheir*.

Introduction

Chiromantes haematocheir (De Haan, 1833) is a common semiterrestrial sesarmid crab in coastal areas ranging from Honshu to Kyushu mainland of Japan, Taiwan, Korea and southeastern China (Sakai, 1976; Dai *et al.*, 1986; Dai & Yang, 1991; Ng *et al.*, 2001). Several authors have previously recorded *C. haematocheir* from the Ryukyu Islands in Japan (e.g. Stimpson, 1858; Ortmann, 1894; Sakai, 1976; Nagai & Nomura, 1988; Shokita, 1990; Kishino *et al.*, 2001; Shokita *et al.*, 2002; 2003; Naruse, 2005), but it does not appear to be a common species there. In recent years, we have obtained several lots of specimens from the Ryukyus which superficially resemble *C. haematocheir*, but appeared to differ from material from other parts of Japan, Taiwan and China in various

subtle but apparently constant features. A re-examination of all the material we have on hand, including the types of *Grapsus* (*Pachysoma*) *haematocheir* De Haan, 1833, confirms that these recent Ryukyu specimens should be recognised as a distinct species.

Holometopus serenei Soh, 1978, a poorly known species from Hong Kong, is supposedly allied to *C. haematocheir*. A re-examination of the holotype male of *H. serenei* as well as fresh material from the type locality clarified that it should be regarded as a junior subjective synonym of *C. haematocheir*.

The present study recognizes only two species for *Chiromantes* s. str., *C. haematocheir* and *C. ryukyuanum*, new species. The new species is described, and detailed comparisons are made with *C. haematocheir*.

Specimens examined are deposited in the Natural History Museum, London (ex British Museum of Natural History, BMNH); the Natural History Museum and Institute, Chiba (CBM); Muséum national d'Histoire naturelle, Paris (MNHN); the Osaka Museum of Natural History, Osaka (OMNH); the Nationaal Natuurhistorisch Museum – Naturalis, Leiden (ex Rijksmuseum van Natuurlijke Historie, RMNH); the Ryukyu University Museum, Fujikan, Okinawa (RUMF); the Wakayama Prefectural Museum of Natural History, Wakayama (WMNH); and the Zoological Reference Collection of the Raffles Museum of Biodiversity Research, National

University of Singapore (ZRC). Measurements provided are of the carapace length (CL) by the carapace width (CW). The abbreviations G1 and G2 are used for the male first and second gonopods respectively.

Taxonomy

Family Sesarmidae

Chiromantes Gistel, 1848

Type species: *Grapsus (Pachysoma) haematocheir* De Haan, 1833 (subsequent designation by Holthuis, 1977: 170).

Remarks.—Ng & Liu (1999) reviewed the taxonomy of the genus *Chiromantes* and suggested that the genus should be limited to the type species, *C. haematocheir* (De Haan, 1833). The characters Ng & Liu (1999) emphasized to separate *C. haematocheir* generically from the other species referred to the genus are: the fused male thoracic sternites 2–4 being proportionately broader with the abdominal cavity reaching midway of fused thoracic sternites 2–4; and the male abdomen being proportionately narrower and distinctly triangular in shape (Ng & Liu, 1999: 229) (Figs. 1b, 4). The status of the genus and of the other species which have been referred to *Chiromantes* thus far are now being reviewed by the second author and C. D. Schubart (see also Ng *et al.*, 2008).

One species of *Chiromantes* not discussed by Ng & Liu (1999) requires comment. *Holometopus serenei* Soh, 1978, was described from Hong Kong, and was regarded as a small species but close to *C. haematocheir*. The holotype (BMNH 1978.107) was examined as well as recently collected specimens from Hong Kong (ZRC 1997.761), and they are clearly *Chiromantes* s. str., possessing all the diagnostic characters stated by Ng & Liu (1999) (Figs. 3, 4b). Soh (1978) differentiated *Holometopus serenei* from *C. haematocheir* by the presence of more prominent tuberculation on the dorsal border of the cheliped dactylus, the shapes of

the front, the abdomen, and the G1, and the small body size (holotype male, 16.0×18.0 mm) (Figs. 3, 4b). Similar-sized specimens of *C. haematocheir* (e.g. RUMF-ZC-544, male, 18.6×20.7 mm), however, show similar shape of the front, abdomen, G1 and also possess tubercles on the dorsal border of the cheliped dactylus (Fig. 2b), which are relatively lower in large specimens (Fig. 2a). The small specimens from Hong Kong collected by the second author (ZRC 1997.761) show the same pattern of variation, and their live coloration agrees with that of small specimens of *C. haematocheir* we have seen from Taiwan and Japan. In any case, large *C. haematocheir* are known from Hong Kong (e.g. ZRC 2002.0224, male, 31.6×36.1 mm). The types of *Holometopus serenei* Soh, 1978, are therefore only juveniles of *C. haematocheir*, and we regard both names as synonyms.

Chiromantes ryukyuanum, new species (Figs. 5a, 6–8)

Chiromantes haematocheir—Naruse, 2005: 221.

Sesarma (Holometopus) haematocheir—Nagai & Nomura, 1988: 42; Kishino *et al.*, 2001: 127; Naruse, 2005: 221.

Material examined.—Holotype: male, 29.6×33.1 mm, RUMF-ZC-539, Taminato, Ohgimi Village, Okinawa Island, Ryukyu Islands, Japan, coll. T. Naruse, 29 Jul. 2007. Paratypes: 1 female, 26.9×30.8 mm, RUMF-ZC-540, east of Funaura Bay, Iriomote Island, Ryukyu Islands, Japan, coll. T. Nagai, 20 Oct. 2005; 1 female, 24.7×28.0 mm, RUMF-ZC-541, west of Mt. Tomori, Funaura Bay, Iriomote Island, Ryukyu Islands, Japan, coll. T. Naruse & T. Nagai, Oct. 2005; 1 female, 25.2×29.0 mm, RUMF-ZC-542, Iriomote Island, Ryukyu Islands, Japan, coll. S. Shokita, 1980's?; 6 males, $5.1 \times 5.4 - 11.9 \times 13.0$ mm, 1 female, 5.9×6.5 mm, RUMF-ZC-543, Oura River, Nago City, Okinawa Island, Japan, coll. T. Maenosono, 9 Jun. 2007; 1 male, 31.3×34.1 mm, ZRC 2007.0640, data same as holotype; 1 female, 30.2×33.8 mm, ZRC 2007.0641, near Fukari River mangrove,

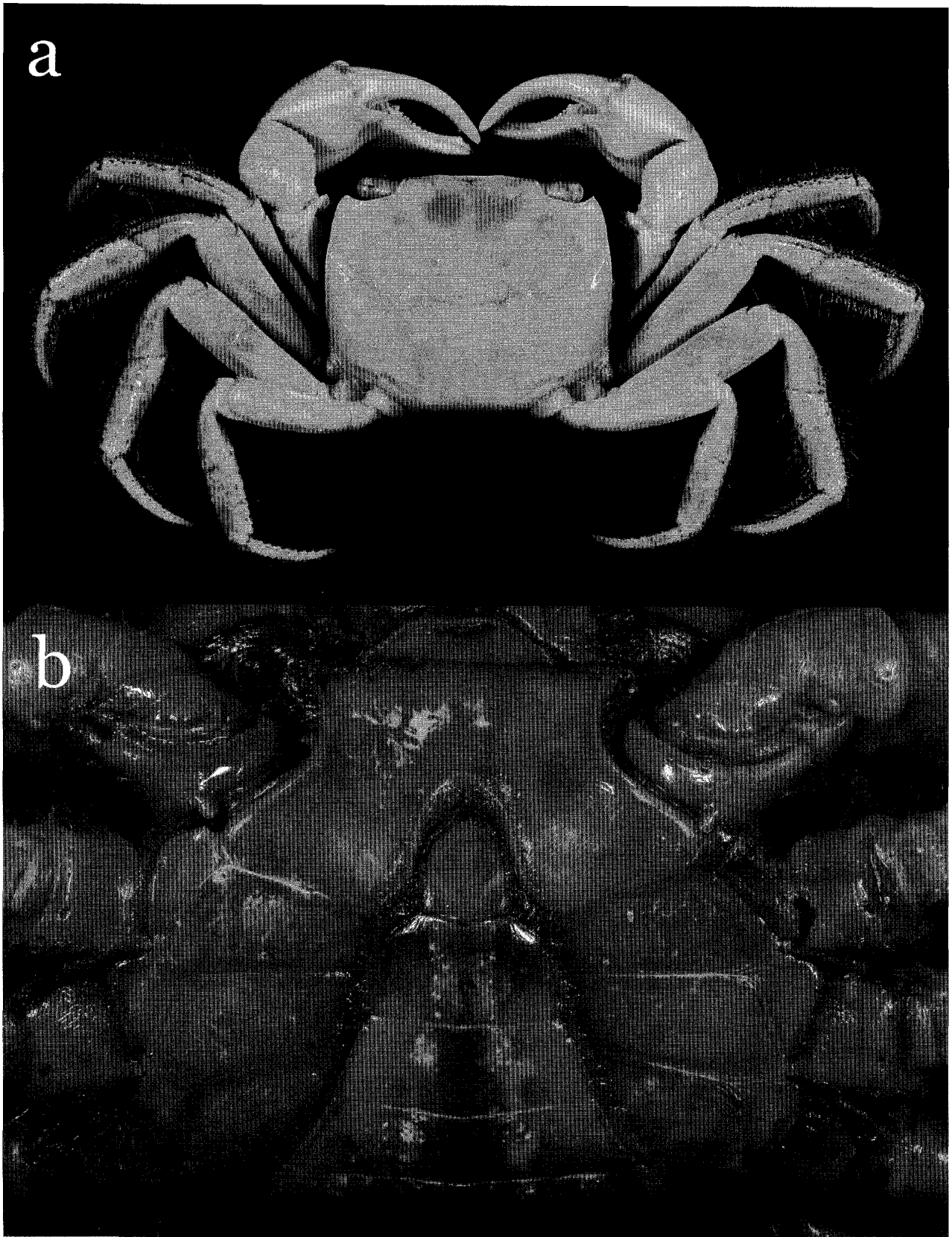


Fig. 1. Lectotypes of *Grapsus* (*Pachysoma*) *haematochir* De Haan, 1833 (RMNH-D 160, male, 29.5×34.0 mm). a, habitus, dorsal view; b, ventral view.

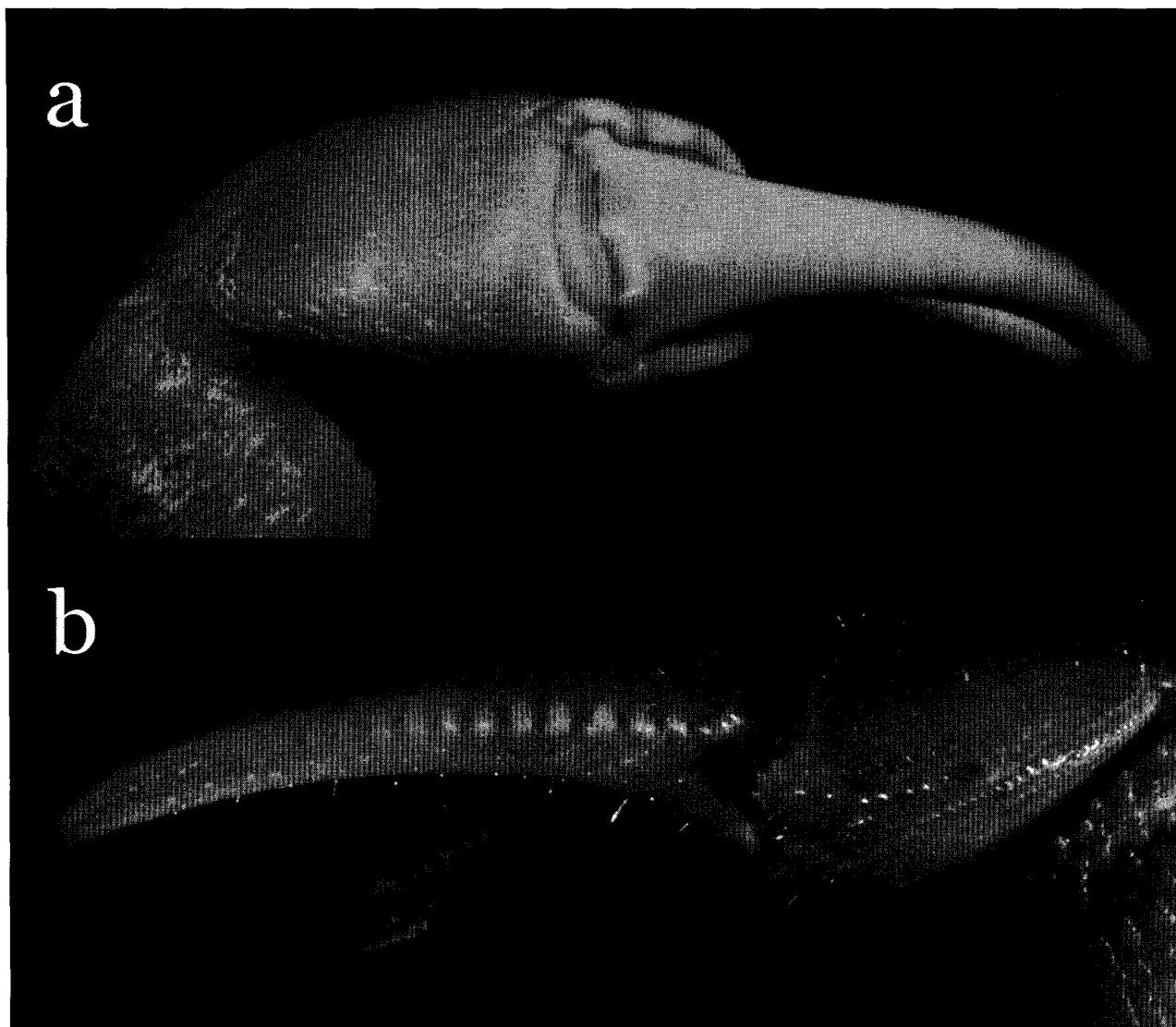


Fig. 2. Dorsal margins of male cheliped palm and dactylus of *Chiromantes haematocheir*. a, lectotype male, 29.5×34.0 mm, RMNH-D 160; b, male, 18.6×20.7 mm, RUMF-ZC-544.

Komi, Iriomote Island, Ryukyu Islands, Japan, coll. T. Naruse, 28 Sep. 2002; 1 male, 31.0×34.6 mm, CBM-ZC 9308, Kijoka, Ohgimi Village, Okinawa Island, Ryukyu Islands, Japan, coll. H. Kimura, 24 Jun. 2007; 1 female, WMNH-Na-Cr-1131, Ohara, Iriomote Island, Ryukyu Islands, Japan, coll. S. Nagai, Mar. 1982; 1 female, 22.7×26.2 mm, OMNH Ar 4809, Ura River, Takigo, Amami-Oshima Island, Ryukyu Islands, Japan, coll. T. Kishino *et al.*, 2 May 2000.

Comparative material.—*Chiromantes haematocheir*. JAPAN: lectotype male, 29.5×34.0 mm, RMNH D 160, Japan, coll. Ph. F.

von Siebold, 1823–1829; paralectotype, 1 female, 23.5×27.5 mm, RMNH D 158, Japan, coll. Ph. F. von Siebold, 1823–1829; paralectotypes, 4 males, $14.8 \times 16.9 - 25.3 \times 28.9$ mm, 1 female, 22.0×26.7 mm RMNH D 159, Japan, coll. Ph. F. von Siebold, 1823–1829; paralectotype, 1 male, 25.3×29.6 mm, MNHN B-12475, Japan, coll. Ph. F. von Siebold, 1823–1829; 1 male, 24.0×26.7 mm, 1 female, 22.8×27.2 mm, ZRC 1970.8.27.7, Kamakura, coll. T. Sakai, 1968; 6 males, $18.3 \times 20.3 - 31.1 \times 34.8$ mm, 2 females, 17.6×20.0 , 20.2×23.1 mm, RUMF-ZC-544, a stream near coastline, west of Mt. Kinugasa, Tahara City, Aichi Prefecture, $34^{\circ}41.625' N$



Fig. 3. Holotype of *Holometopus serenei* Soh, 1978 (BMNH 1978.107, male, 16.6 × 18.4 mm).

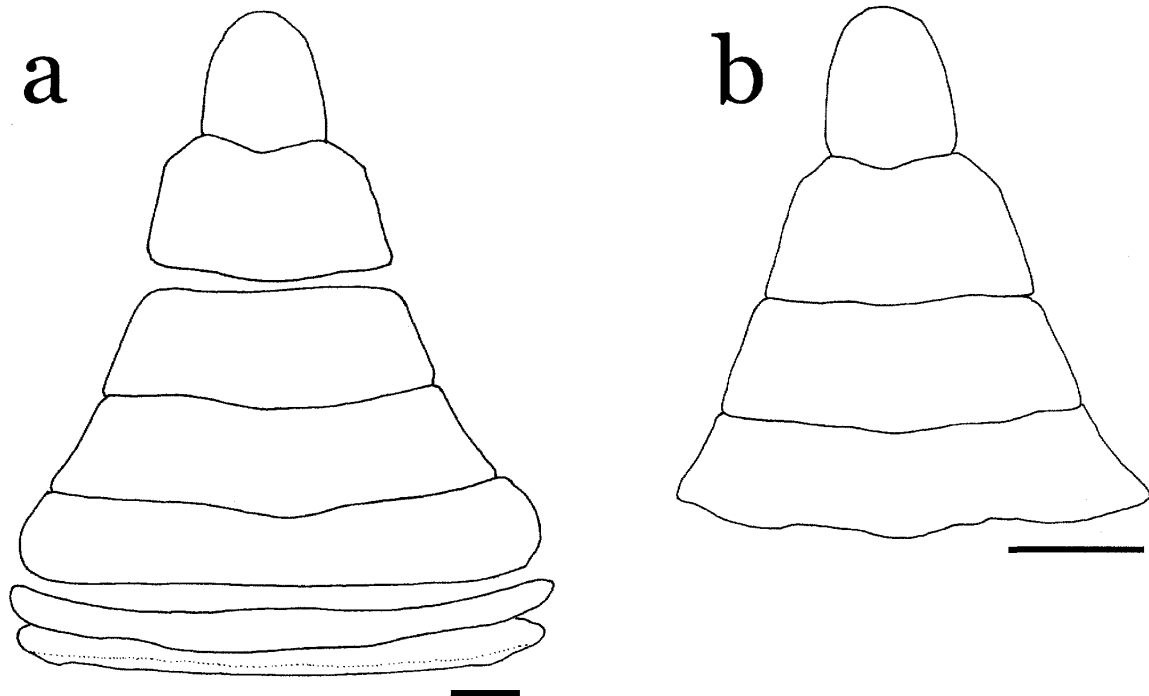


Fig. 4. Male abdomen and telson of *Chiromantes haematocheir* and *Holometopus serenei*. a, *C. haematocheir*, lectotype, male, RMNH-D-160, 29.5 × 34.0 mm; b, *H. serenei*, holotype, male, BMNH 1978.107, 16.6 × 18.4 mm. Scales, 5 mm.

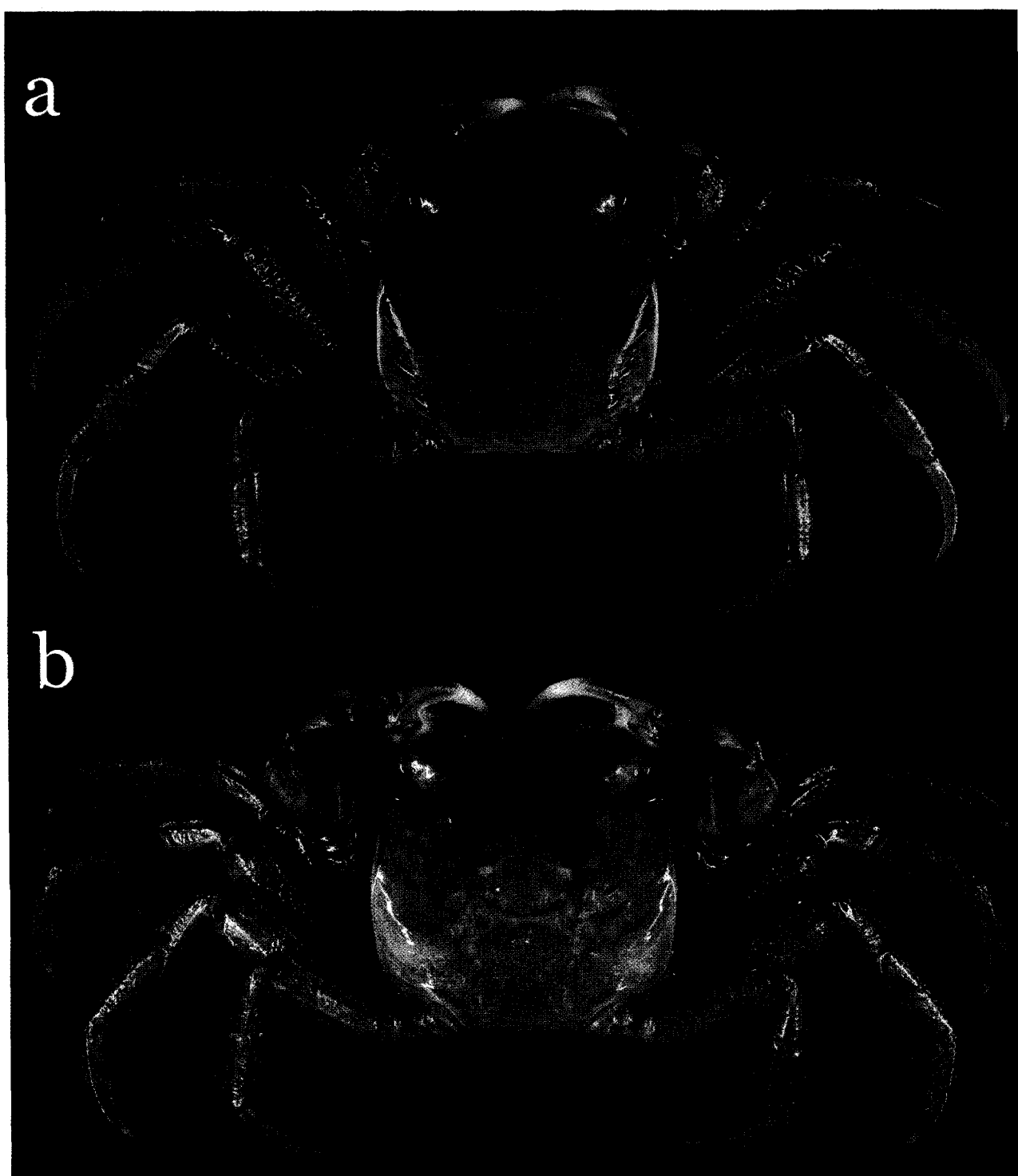


Fig. 5. Live coloration of *Chiromantes ryukyuanum*, new species and *C. haematocheir* (De Haan, 1833). a, *C. ryukyuanum*, holotype male, RUMF-ZC-539, 29.6×33.1 mm; b, *C. haematocheir*, male, RUMF-ZC-544, 31.1×34.8 mm.

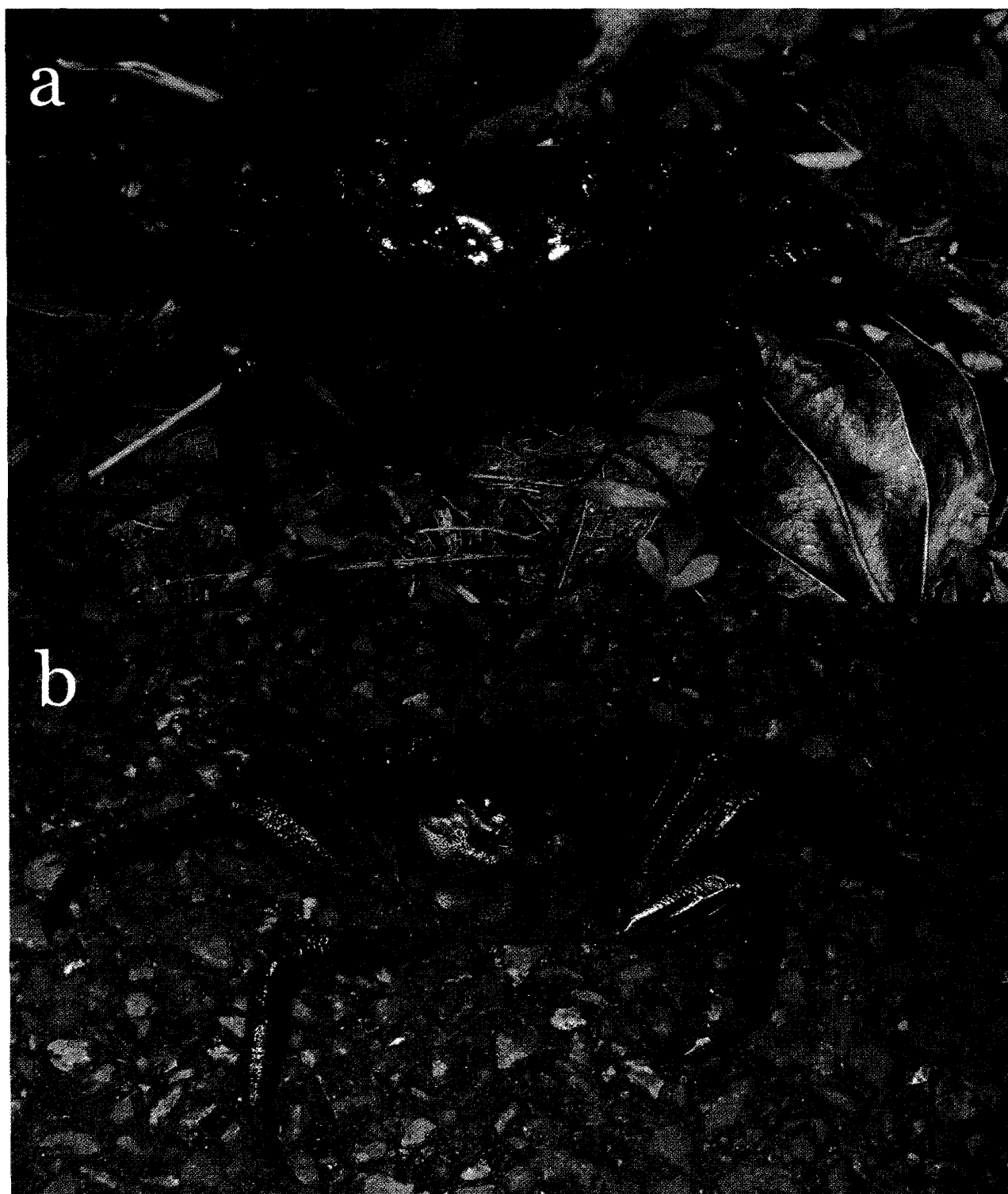


Fig. 6. Live coloration of *Chiromantes ryukyuanum*, new species. a, paratype male, ZRC 2007.0640, 31.3 \times 34.1 mm; b, paratype female, ZRC 2007.0641, 30.2 \times 33.8 mm.

137°19.338' E, coll. T. Naruse, 26 Jul. 2007; 1 female, 11.6 × 13.3 mm, RUMF-ZC-820, Beppu River, Aira Town, Kagoshima Prefecture, Kyushu, Japan, coll. T. Maenosono, 2 Jan. 2007; 2 males, 27.6 × 31.6, 28.3 × 32.6 mm, ZRC 1964.9.8.12–13, Japan, coll. S. Miyake. TAIWAN: 1 male, 25.1 × 28.1 mm, 2 females, 11.8 × 14.3, 19.7 × 23.2 mm, ZRC 2002.0221, Yan Liao, coll. P.-H. Ho *et al.*, 16 Oct. 1985; 1 male, 13.5 × 15.0 mm, ZRC 2002.0472, north of Meilun Stream, Hualien City, Hualien County, 23°58'54" N, 121°36'37" E, coll. P. K. L. Ng & H.-C. Liu, 22 Jun. 2002; 5 males, 13.9 × 23.4 – 31.3 × 35.7 mm, 1 female, 20.3 × 23.4 mm, ZRC 2002.0415, Pei Kuan, garden in Lion Museum, Toucheng Town area, Ilan County, coll. H.-C. Liu *et al.*, 21 Jun. 2002. CHINA: 1 male, 31.6 × 36.1 mm, ZRC 2002.0224, Hong Kong, purchased by H. H. Tan, Jul. 2000; 6 females, 11.3 × 12.9 – 21.5 × 24.7 mm, ZRC 1997.761, Tai Tam, immediately downstream of Tai Tam Dam, south coast of Hong Kong Island, Hong Kong, coll. P. K. L. Ng & S. Y. Lee, 6 Jun. 1996; 1 male, 16.6 × 18.4 mm, BMNH 1978.107 (holotype of *Holometopus serenei* Soh, 1978), from rice field at Tai Po, Hong Kong, coll. C. L. Soh, 8 Jun. 1975.

Description.—Carapace (Figs. 5a, 6) quadrate, CW 1.09–1.15 times (mean = 1.13, *n* = 8) CL, slightly convex dorsally; dorsal surface smooth, epibranchial region with one longitudinal inner and one oblique outer depressions; posterolateral regions with oblique rows of tiny granules; H-shaped gastric groove shallow, a pair of shallow pits anterior to groove. Front deflexed almost perpendicularly from postfrontal transverse ridge, anterior margin straight, recurvate, L-shaped in lateral view; preorbital tooth short, reaching only halfway to anterolateral angle of front. Epistome trilobate, cristate, granulated, median lobe slightly longer than lateral lobes, outer margin of lateral lobe long, weakly concave, densely lined with soft setae. Supraorbital margin semicircular; external orbital angle acute, directed anteri-

orly; anterolateral margin weakly convergent anteriorly, with no epibranchial tooth, downwardly-inclined anteriorly, with no epibranchial tooth; posterolateral margins subparallel, downwardly-inclined posteriorly.

Eyes with relatively large cornea. Basal segments of antennule and antenna almost in contact, not separated by septum, antennal flagellum intruding into orbit. Third maxilliped with ischium and merus subequal in length; palp flat, reaching proximal fifth of merus *in situ*, exopod hidden beneath ischium and merus, slender, weakly widened subdistally, reaching distal third of merus, with long flagellum.

Thoracic sternites (Fig. 7a) 1–3 short, sternites 1/2, 3, and 4 well separated, borders lined with soft setae; sternite 4 wide, widened anteriorly, sternal cavity reaching imaginary line joining posterior half of cheliped coxae, sternal condyle absent. Chelipeds subequal, more massive in male; merus with inner lower margin weakly foliaceous with distal third serrate, inner surface with line of black setae, proximal upper part sparsely setose; carpus with roughly granulated dorsal surface, inner angle not clearly delineated; palm (Fig. 7b, c) relatively compressed, higher than long, outer surface smooth, inner surface with scattered granulated on upper two-thirds, dorsal surface with several oblique line of small granules (Fig. 7c), distomesial margin produced, serrate; fingers about one and half times as long as palm, leaving elongate elliptical gape when closed, tips corneous, slightly beak-like; movable finger slender, slightly curved downwards by proximal third, dorsal margin lined with about 18, low and rounded tubercles on proximal three-fourths (Fig. 7c), occlusal margin with subproximal, median, and subdistal large teeth, accompanied with small teeth; immovable finger with high base, about half height of palm, occlusal margin with subproximal and subdistal teeth. Ambulatory legs (Figs. 5a, 6) slender, relatively long, second leg longest, length of merus to dactylus 1.87–2.05 times (mean 1.97, *n* = 7) CL, distal angle of merus of sec-

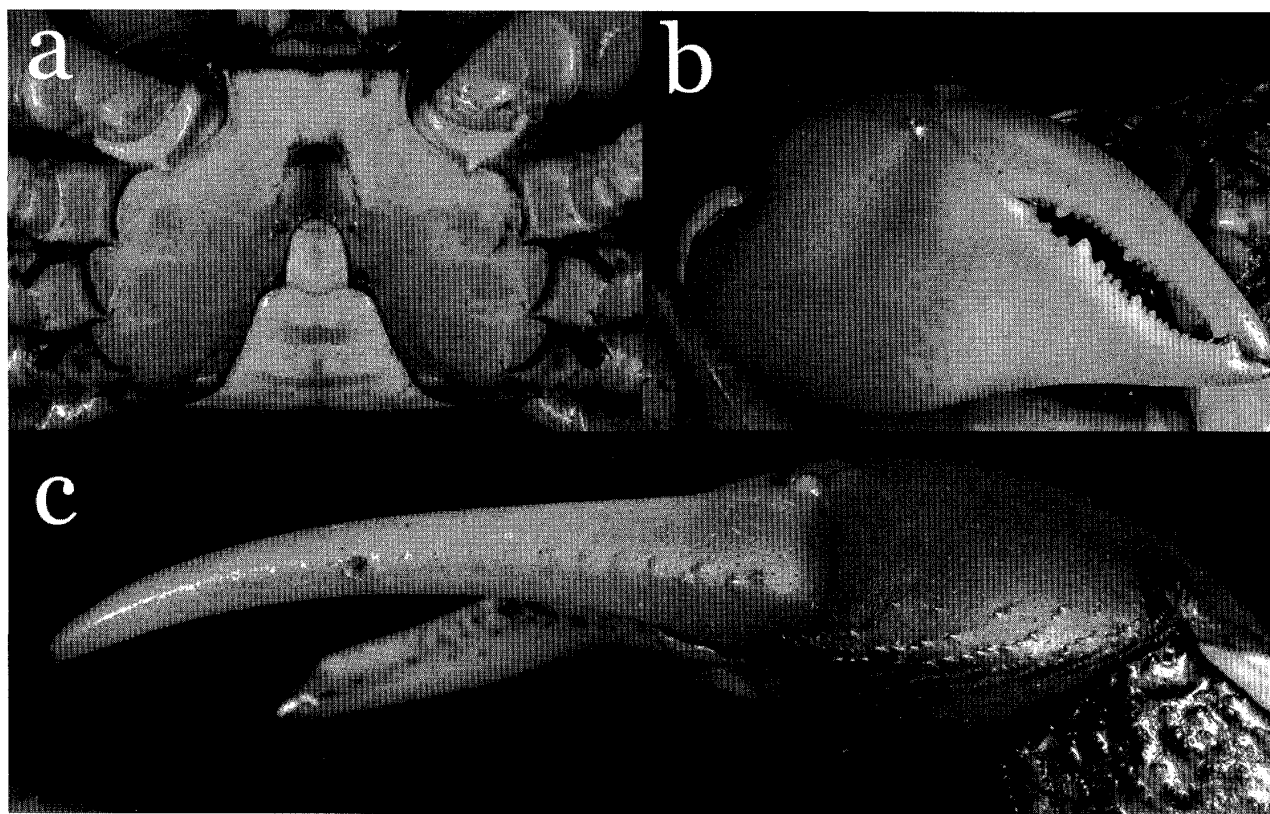


Fig. 7. Holotype of *Chiromantes ryukyuanum*, new species (RUMF-ZC-539, male, 29.6×33.1 mm). a, ventral view; b, chela, outer view; c, palm and movable finger of chela, dorsal view.

ond ambulatory leg reaching beyond level of frontal margin when stretched anteriorly; anterior surfaces of coxae with tufts of setae (Fig. 7a), those of second and third legs more prominent, meri with anterior and posterior margins parallel, with subterminal tooth on anterior margin, dorsal surfaces partially with reticulated embossed patterns; propodi to dactyli with tufts of black, stiff, short setae; dactyli to propodi of first and second legs and dactylus and distal third of propodus of third leg with mats of dense black setae on inner margins, no such mat on fourth leg; dactylus sickle-shaped, with corneous tip. Male abdomen gradually narrowed toward sixth segment (Figs. 7a, 8a), third segment widest, sixth segment width 1.83–2.07 times (mean 1.97, $n = 3$) length, telson as long as sixth segment. G1 (Fig. 8b) straight, slightly curving dorsally, tip with truncate, corneous beak, base of beak densely covered with setae. G2 (Fig. 8c) small, opening distal.

Colouration.—Somewhat variable. Holotype with yellowish anterior half of the carapace and marble-like black patterns; posterior half and ambulatory legs gray (Fig. 5a). Large paratype males with more vermilion carapace and legs (Fig. 6a). Females and small individuals tend to be greyish-yellow (Fig. 6c). Palms of large individuals always red (Figs. 5a, 6a).

Ecological note.—Adults of *Chiromantes ryukyuanum*, new species, have so far only been found near small hills which are located just beside coastlines of bays at night around the time of full moon. During this time, most of the females observed are ovigerous. Considering the timing and the site of the collections and the presence of ovigerous females, the collected individuals appeared to be migrating to the site for reproduction. It is not known what kind of habitat the adults usually prefer. Juveniles of the species have been found near a saline swamp along a river and beside a small hill

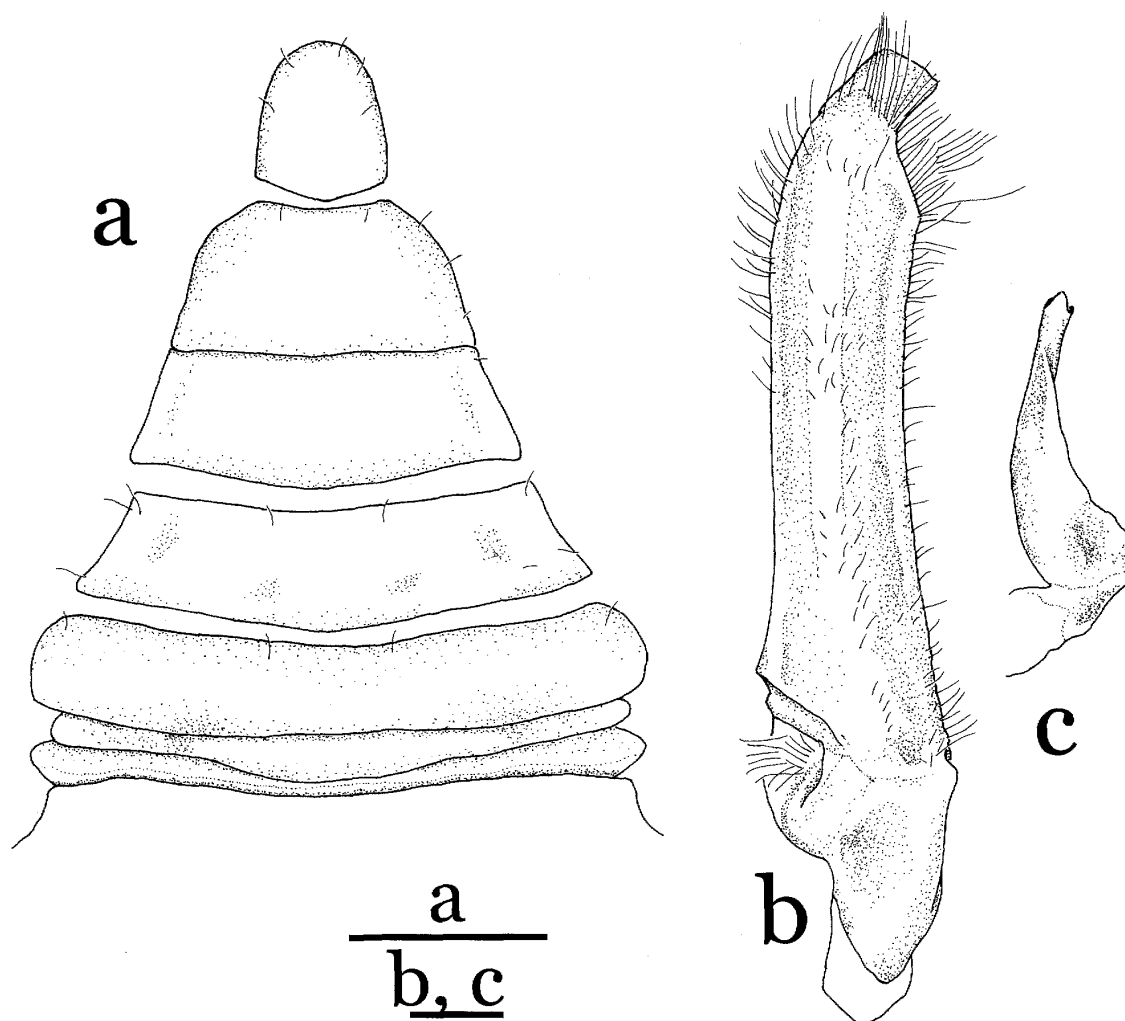


Fig. 8. Holotype of *Chiromantes ryukyuanum*, new species (RUMF-ZC-539, male, 29.6 × 33.1 mm). a, abdomen and telson; b, G1; c, G2. Scales, a, 5mm; b, c, 1 mm.

(T. Maenosono, pers. comm.).

Distribution.—We have material of *Chiromantes ryukyuanum*, new species, from Okinawa, Iriomote and Amami-Oshima islands of the Ryukyu Islands; and the species has also been observed and photographed from Kakeroma Island of the Amami Group (T. Maenosono, pers. comm.).

Remarks.—*Chiromantes ryukyuanum*, new species, is morphologically very similar to *C. haematocheir*. The most important characters to distinguish *C. ryukyuanum* from *C. haematocheir* are the relatively longer and slender ambulatory legs (Fig. 9b) and rather compressed carapace. With

regard to the differences of the ambulatory legs, it is clear when relative length against the carapace are compared. In *C. ryukyuanum*, the distal end of the merus of the second ambulatory leg reaches beyond the level of the frontal margin when stretched anteriorly (Figs. 5a, 6). In contrast, in *C. haematocheir*, the distal ends of the second ambulatory meri just reach the extra-orbital angle and frontal margin in large individuals (Figs. 5b) and young individuals, respectively. In addition, *C. ryukyuanum* is different from *C. haematocheir* in its proportionally wider male sixth abdominal segment (Fig. 8a vs. Fig. 4) (Fig. 9c), proportionally narrower front (Fig. 5a vs. Figs. 1a, 5b) (Fig.

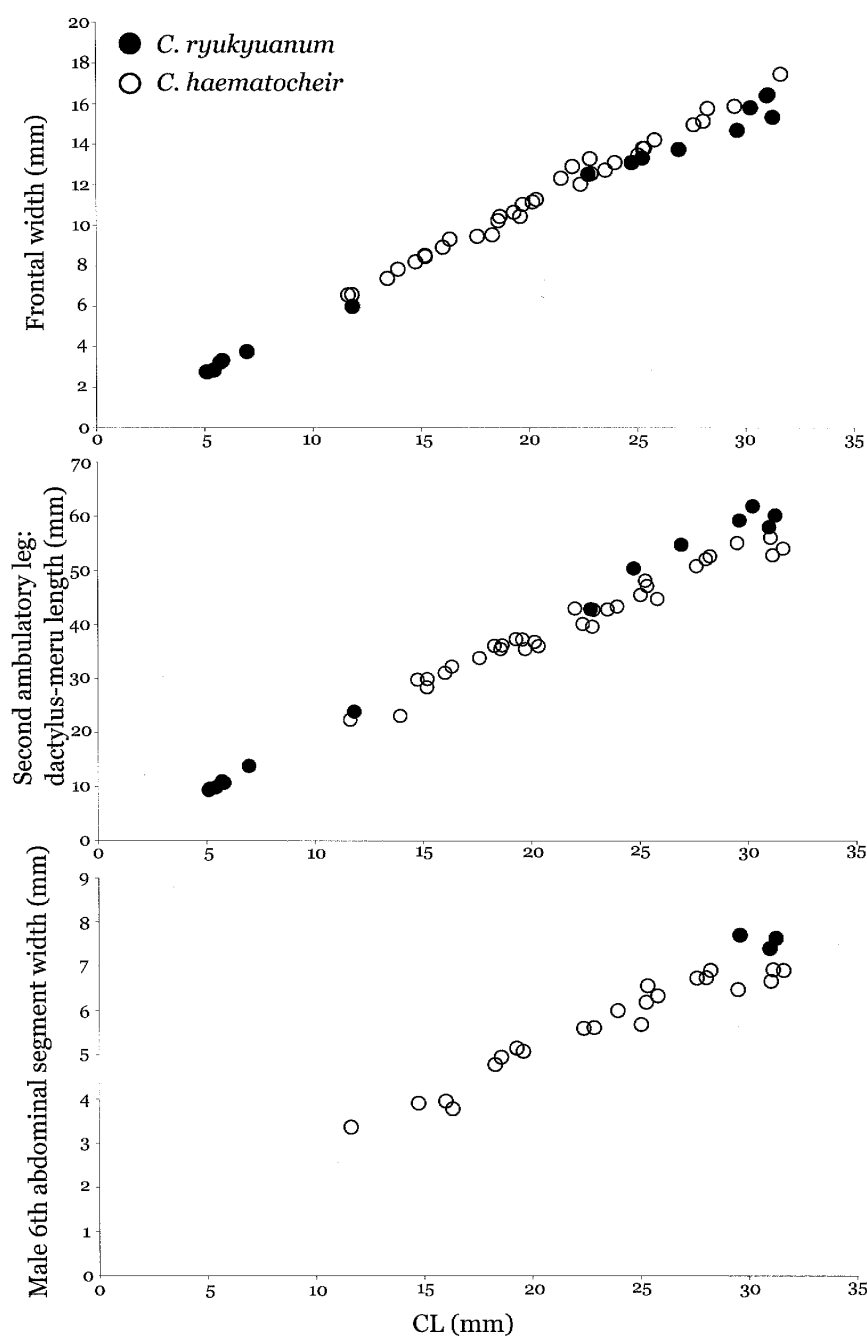


Fig. 9. Allometric growth of frontal width, dactylus to merus length of second ambulatory legs, and male sixth abdominal segment width of *Chiromantes ryukyuanum*, new species, and *C. haematocheir* (De Haan, 1833). Closed circle, *C. ryukyuanum*; open circle, *C. haematocheir*.

9a), shorter and more sparse setae on the ambulatory legs (Figs. 5a, 6 vs. Fig. 5b) and proportionally larger cornea of the eye (Figs. 5a, 6). Large males of both species can be distinguished by the characters of the chela. In *C. ryukyuanum*, the row of granules remain on the dorsal surface of the movable

finger of the chela, and the palm is less inflated, with distinct oblique lines of granules on dorsal surface (Fig. 7c). In contrast, in *C. haematocheir*, granules on the dactylus are indistinct, and the palm is more inflated, with lines of granules reduced and even in compressed to one longitudinal line in some

large specimen (e.g. RUMB-ZC-544, male, 31.1×34.8 mm). The live colouration of *C. ryukyuanum* is also different from that of *C. haematocheir*. Although the coloration is variable in *C. haematocheir*, its main pattern of the adult is a dark green carapace and ambulatory legs with yellowish to reddish anterior to anterolateral margins of the carapace (Fig. 5b; Miyake, 1983: 179, pl. 60(1); Wang & Liu, 1996: 115, Fig. 147; Minemizu, 2000: 297), which is not observed for *C. ryukyuanum*.

Nagai & Nomura (1988) have provided a photograph of "*Sesarma (Holometopus) haematocheir* (De Haan)", which was taken in Iriomote Island by Mr. Teruo Fukuda in 1974 (K. Nomura, pers. comm.). Its slender and less setose ambulatory legs, relatively flattened carapace, and less inflated palm of the cheliped clearly suggest that the individual is actually *C. ryukyuanum* instead. Kishino *et al.* (2001) recorded "*C. haematocheir*" from Amami-Oshima Island, but re-examination of their specimen (OMNH Ar 4809, 1 female, 22.7×26.2 mm) revealed that it is *C. ryukyuanum*. Several authors also have previously recorded "*C. haematocheir*" from the Ryukyu Islands (Amami-Oshima: Stimpson, 1858; Ortmann, 1894; Shokita *et al.*, 2003; Okinawa Island: Sakai, 1976; Iriomote Island: Shokita, 1990; Shokita *et al.*, 2002). All the material we have examined from Amami-Oshima, Okinawa and Iriomote islands are *C. ryukyuanum*. This indicates that all previous records of "*C. haematocheir*" from the Ryukyu Islands are most probably of *C. ryukyuanum*. In lieu of examining all the above authors' material, we cannot be certain if *C. haematocheir* s. str. is also present in the Ryukyus. Considering that we have good records of *C. haematocheir* s. str. from the main island of Japan (to the north of the Ryukyus) and Taiwan and Hong Kong (to the west of the Ryukyus), it is interesting that *C. haematocheir* is truly absent from the Ryukyus.

Acknowledgements

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